04-06-00

Practitioner's Docket No. 477-007455-US (D01) **PATENT**

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P. § 601, 7th ed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Frank Nuovo, Morten Rolighed Christenen, Sten Carlsen, Christian Kraft

WARNING: *37 C.F.R. § 1.41(a)(1) points out:*

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors."

For (title): NAVIGATION KEY FOR A HANDSET

CERTIFICATION UNDER 37 C.F.R. § 1.10*
(Express Mail label number is mandatory.)
(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date 4/5/00, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL 336 863 672 US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

June Adams
(type or print name of person mailing paper)

June Adams
Signature of person mailing paper

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

WARNING:* *Each paper or fee filed by "Express Mail" **must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).*
*"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.*

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
- ☐ Design
  - ☐ Plant

WARNING: ***Do not*** *use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.*

WARNING: ***Do not*** *use this transmittal for the filing of a provisional application.*

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☒ Divisional.
- ☐ Continuation.
- ☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(l) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: *If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.*

WARNING: *When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application* ***must*** *be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).*

☒ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

25 Pages of specification

5 Pages of claims

6 Sheets of drawing

WARNING: ***DO NOT*** *submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).*

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c)).

(complete the following, if applicable)

☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).

☐ formal

☒ informal

B. Other Papers Enclosed

16 Pages of declaration and power of attorney

1 Pages of abstract

____ Other

4. Additional papers enclosed

☒ Amendment to claims

☒ Cancel in this applications claims 2, 22-27 before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☒ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☒ Preliminary Amendment

☒ Information Disclosure Statement (37 C.F.R. § 1.98)

☒ Form PTO–1449 (PTO/SB/08A and 08B)

☒ Citations

☐ Declaration of Biological Deposit

☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative

☐ Special Comments

☐ Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)–(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)–(4).

NOTE: "The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.62, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors." 37 C.F.R. § 1.41(a)(1).

☒ Enclosed (copy)

Executed by

(check all applicable boxes)

☒ inventor(s).

☐ legal representative of inventor(s). 37 C.F.R. §§ 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of *all* the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

☐ Showing that the filing is authorized.
(not required unless called into question. 37 C.F.R. § 1.41(d))

6. Inventorship Statement

WARNING: *If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.*

The inventorship for all the claims in this application are:

☒ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of $130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

8. Assignment

☒ An assignment of the invention to Nokia Mobile Phones Limited
was recorded on 12/12/97 in Reel 8922, Frame 0027

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: *A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.*

9. Certified Copy

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☐ is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. § 1.16)

A. ☒ Regular application

CLAIMS AS FILED					
Number filed		Number Extra		Rate	Basic Fee 37 C.F.R. § 1.16(a) $690.00
Total Claims (37 C.F.R. § 1.16(c))	27	− 20 = 7	×	$ 18.00	126.00
Independent Claims (37 C.F.R. § 1.16(b))	6	− 3 = 3	×	$ 78.00	234.00
Multiple dependent claim(s), if any (37 C.F.R. § 1.16(d))			+	$260.00	

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation $ 1,050.00

B. ☐ Design application ($310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation $_____

C. ☐ Plant application
($480.00—37 C.F.R. § 1.16(g))

Filing fee calculation $_____

11. Small Entity Statement(s)

☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

WARNING: *"Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).*

WARNING: *"Small entity status must not be established when the person or persons signing the . . . statement can* ***unequivocally*** *make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).*

(complete the following, if applicable)

☐ Status as a small entity was claimed in prior application _____ / _____, filed on _____, from which benefit is being claimed for this application under:

35 U.S.C. § ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of **A, B** or **C** above)

$_____

NOTE: Any excess of the full fee paid will be refunded if small entitiy status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made at This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time.
(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)

☒ Enclosed

☒ Filing fee $1,050.00

☐ Recording assignment ($40.00; 37 C.F.R. § 1.21(h)) (See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW APPLICATION".) $ _____

☐ Petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached ($130.00; 37 C.F.R. §§ 1.47 and 1.17(i)) $ _____

☐ For processing an application with a specification in a non-English language ($130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k)) $ _____

☐ Processing and retention fee ($130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l)) $ _____

☐ Fee for international-type search report ($40.00; 37 C.F.R. § 1.21(e)) $ _____

NOTE: 37 C.F.R. § 1.21(l) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(l) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed $1,050.00

14. Method of Payment of Fees

☒ Check in the amount of $1,050.00

☐ Charge Account No. _____ in the amount of $_____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: *If no fees are to be paid on filing, the following items should not be completed.*

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.*

☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350 :

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: *Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.*

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

NOTE: *". . .A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).*

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: *Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).*

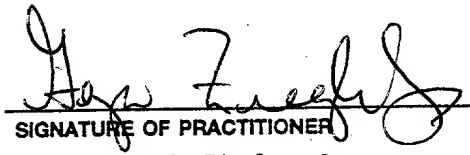
NOTE: *37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . " From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.*

16. Instructions as to Overpayment

NOTE: ". . . Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

☒ Credit Account No. 16-1350

☐ Refund



SIGNATURE OF PRACTITIONER

Reg. No. 44,004

Geza C. Ziegler, Jr.

(type or print name of attorney)

Tel. No. (203) 259-1800 x119

Perman & Green, LLP

P.O. Address

Customer No.

425 Post Road
Fairfield, CT 06430

☒ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

☒ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added 5

☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added __________

☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added __________

☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added __________

☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

☐ This transmittal ends with this page.

Practitioner's Docket No. 477-007455-US (D01) **PATENT**

ADDED PAGES FOR APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED

NOTE: See 37 CFR 1.78(a).

17. Relate Back

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(complete the following, if applicable)

☒ Amend the specification by inserting, before the first line, the following sentence:

A. 35 U.S.C. 119(e)

NOTE: "Any nonprovisional application claiming the benefit of one or more prior filed copending provisional applications must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior provisional application, identifying it as a provisional application, and including the provisional application number (consisting of series code and serial number)." 37 C.F.R. § 1.78(a)(4).

☐ "This application claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S).:	FILING DATE
_____ /_____	_____ "
_____ /_____	_____ "
_____ /_____	_____ "

B. 35 U.S.C. 120, 121 and 365(c)

NOTE: "Any nonprovisional application claiming the benefit of one or more prior filed copending nonprovisional applications or international applications designating the United States of America must contain or be amended to contain in the first sentence of the specification following the title a reference to each such prior application, identifying it by application number (consisting of the series code and serial number) or international application number and international filing date and indicating the relationship of the applications. Cross-references to other related applications may be made when appropriate." (See § 1.14(b)). 37 C.F.R. § 1.78(a)(2).

☒ "This application is a

- ☐ continuation
- ☐ continuation-in-part
- ☒ divisional

of copending application(s)

☒ application number 08/923,686 filed on 9/4/97"

☐ International Application ______________ filed on ______________ and which designated the U.S."

NOTE: The proper reference to a prior filed PCT application that entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application that designated the U.S.

NOTE: (1) Where the application being transmitted adds subject matter to the International Application, then the filing can be as a continuation-in-part or (2) if it is desired to do so for other reasons then the filing can be as a continuation.

☐ "The nonprovisional application designated above, namely application ____/____________, filed ________, claims the benefit of U.S. Provisional Application(s) No(s).:

APPLICATION NO(S).:	FILING DATE
____/____________	____________"
____/____________	____________"
____/____________	____________"

NOTE: The deadline for entering the national phase in the U.S. for an international application was clarified in the Notice of April 28, 1987 (1079 O.G. 32 to 46) as follows:

"The Patent and Trademark Office considers the International application to be pending until the 22nd month from the priority date if the United States has been designated and no Demand for International Preliminary Examination has been filed prior to the expiration of the 19th month from the priority date and until the 32nd month from the priority date if a Demand for International Preliminary Examination which elected the United States of America has been filed prior to the expiration of the 19th month from the priority date, provided that a copy of the international application has been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively. If a copy of the international application has not been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively, the international application becomes abandoned as to the United States 20 or 30 months from the priority date respectivley. These periods have been placed in the rules as paragraph (h) of § 1.494 and paragraph (i) of § 1.495. A continuing application under 35 U.S.C. 365(c) and 120 may be filed anytime during the pendency of the international application."

18. Relate Back—35 U.S.C. 119 Priority Claim for Prior Application

The prior U.S. application(s), including any prior International Application designating the U.S., identified above in item 17B, in turn itself claim(s) foreign priority(ies) as follows:

Country	Appln. no.	Filed on

The certified copy(ies) has (have)

☐ been filed on ____________, in prior application 0 /______________, which was filed on ______________.

☐ is (are) attached.

WARNING: *The certified copy of the priority application that may have been communicated to the PTO by the International Bureau may not be relied on without any need to file a certified copy of the priority application in the* ***continuing application.*** *This is so because the certified copy of the priority application communicated by the International Bureau is placed in a folder and is not assigned a U.S. serial number unless the national stage is entered. Such folders are disposed of if the national stage is not entered. Therefore, such certified copies may not be available if needed later in the prosecution of a continuing application. An alternative would be to physically remove the priority documents from the folders and transfer them to the continuing application. The resources required to request transfer, retrieve the folders, make suitable record notations, transfer the certified copies, enter and make a record of such copies in the Continuing Application are substantial. Accordingly, the priority documents in folders of international applications that have not entered the national stage may not be relied on. Notice of April 28, 1987 (1079 O.G. 32 to 46).*

19. Maintenance of Copendency of Prior Application

NOTE: The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the continuation application. Notice of November 5, 1985 (1060 O.G. 27).

A. ☐ Extension of time in prior application

(This item ***must*** *be completed and the papers filed* ***in the prior application,*** *if the period set in the prior application has run.)*

☐ A petition, fee and response extends the term in the pending **prior** application until ______________________.

☐ A **copy** of the petition filed in prior application is attached.

B. ☐ Conditional Petition for Extension of Time in Prior Application

(complete this item, if previous item not applicable)

☐ A conditional petition for extension of time is being filed in the pending **prior** application.

☐ A **copy** of the conditional petition filed in the prior application is attached.

20. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

NOTE: *"If the continuation, continuation-in-part, or divisional application is filed by less than all the inventors named in the prior application a statement must accompany the application when filed requesting deletion of the names of the person or persons who are not inventors of the invention being claimed in the continuation, continuation-in-part, or divisional application." 37 CFR 1.62(a) [emphasis added] (dealing with the file wrapper continuation situation).*

NOTE: *"In the case of a continuation-in-part application which adds and claims additional disclosure by amendment, an oath or declaration as required by § 1.63 must be filed. In those situations where a new oath or declaration is required due to additional subject matter being claimed, additional inventors may be named in the continuing application. In a continuation or divisional application which discloses and claims only subject matter disclosed in a prior application, no additional oath or declaration is required and the application must name as inventors the same or less than all the inventors in the prior application." 37 CFR 1.62(c) (dealing with the continuation situation).*

(complete applicable item (a), (b) and/or (c) below)

(a) ☒ This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are

- ☒ the same.
- ☐ less than those named in the prior application. It is requested that the following inventor(s) identified for the prior application be deleted:

_____

(type name(s) of inventor(s) to be deleted)

(b) ☐ This application discloses and claims additional disclosure by amendment and a new declaration or oath is being filed. With respect to the prior application, the inventor(s) in this application are

- ☐ the same.
- ☐ the following additional inventor(s) have been added:

_____

(type name(s) of inventor(s) to be added)

(c) The inventorship for all the claims in this application are

- ☐ the same.
- ☐ not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made
  - ☐ is submitted.
  - ☐ will be submitted.

21. Abandonment of Prior Application *(if applicable)*

☐ Please abandon the prior application at a time while the prior application is pending, or when the petition for extension of time or to revive in that application is granted, and when this application is granted a filing date, so as to make this application copending with said prior application.

NOTE: According to the Notice of May 13, 1983 (103, TMOG 6-7), the filing of a continuation or continuation-in-part application is a proper response with respect to a petition for extension of time or a petition to revive and should include the express abandonment of the prior application conditioned upon the granting of the petition and the granting of a filing date to the continuing application.

22. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

WARNING: "The claims of a new application may be finally rejected in the first Office action in those situations where (1) the new application is a continuing application of, or a substitute for, an earlier application, and (2) all the claims of the new application (a) are drawn to the same invention claimed in the earlier application, and (b) would have been properly finally rejected on the grounds of art of record in the next Office action if they had been entered in the earlier application." MPEP, § 706.07(b).

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary.

(check the next item, if applicable)

☐ There is provided herewith a Petition To Suspend Prosecution for the Time Necessary to File An Amendment (New Application Filed Concurrently)

23. Small Entity (37 CFR § 1.28(a))

☐ Applicant has established small entity status by the filing of a verified statement in parent application /________ on ________ .

☐ A copy of the verified statement previously filed is included.

WARNING: See 37 CFR § 1.28(a).

24. NOTIFICATION IN PARENT APPLICATION OF THIS FILING

☐ A notification of the filing of this
(check one of the following)

☐ continuation

☐ continuation-in-part

☐ divisional

is being filed in the parent application, from which this application claims priority under 35 U.S.C. § 120.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Nuovo, et al.

SERIAL NO.: ART UNIT:

FILED: Herewith EXAMINER:

TITLE: NAVIGATION KEY FOR A HANDSET

ATTORNEY DOCKET NO.: 477-007455-US (D01)

Commissioner of Patents and Trademarks
Washington, DC 20231

PRELIMINARY AMENDMENT

Sir:

This preliminary amendment is being filed in conjunction with the filing of a Rule 1.53(b) divisional application. The parent of this divisional application, which this application relies on for an earlier filing date, is copending and allowed U.S. Patent Application S.N. 08/923,686 filed on September 4, 1997.

Please amend the application as follows:

IN THE SPECIFICATION:

Page 8, line 18, change "22" to --33--.

Page 31, in the Abstract, line 10, delete "Fig. 3".

IN THE CLAIMS:

Please cancel claims 2, and 22-27.

Please amend the following claims:

1. (Amended) A telephone handset having a front surface with a display and a keypad, wherein said keypad includes a group of keys for [entering alphanumeric signs] data entry and a key for navigating a cursor in the display and selecting an item in dependence of the position of the cursor,

said navigation and selection key [is placed] positioned in the front surface of the phone between the display and the group of [alphanumeric] data entry keys,

said navigation and selection key includes a roller body [which extends partly through an opening in the front surface of the phone, and] which is essentially cylindrical with a length and diameter of substantially the same size as the width of the keys in said group of keys for entering alphanumeric signs, and extends partly through an opening in the front surface of the phone, and has an axis of rotation perpendicular to the longitudinal axis of the phone,

said roller body is fully rotatable and is allowed to adopt a predetermined number of valid positions during a

rotation for moving the cursor, and can be depressed to request performance of an action in dependence of the position of the cursor.

3. (Amended) A telephone handset according to [claims] claim 1, wherein the keys in said group of keys [for entering alphanumeric signs] are arranged in three columns each having four keys, and said navigation key is placed as an extension of the central column.

In claims 4 and 5, line 1, change "claims" to --claim--.

In claim 6, line 6, change "relatively" to --relative--.

In claim 11, line 6, change "relatively" to --relative--.

Please add the following claims:

--28. The telephone handset of claim 1 wherein a position of the navigation and selection key is determined to enable one handed operation of the phone.

29. The telephone handset of claim 1 wherein a position of the navigation and selection key is determined to allow the user to hold the phone in one hand and manipulate the navigation and selection key with the thumb of that hand.

30. The telephone handset of claim 1 wherein the navigation and selection key performs a swing movement around a hinge axis when depressed to activate a microswitch.

31. The telephone handset according to claim 1 wherein the roller body is adapted to have twelve positions per revolution, each position being mechanically defined.

32. In a radio telephone handset comprising a housing, electronic circuitry located in the housing, an antenna connected to the electronic circuitry, and a user interface connected to the electronic circuitry, the user interface comprising a display and a keypad extending through a side of the housing, wherein the improvement comprises:

the user interface further comprising a combined navigation and selection input device comprising a roller extending partially through an aperture in the side of the housing, wherein the roller is connected to the housing for rotation about an axis of the rotation substantially parallel to the housing side, wherein the roller can be depressed, at least partially, through the aperture in the direction substantially perpendicular to the side, and wherein the aperture is located between the display and at least one key of the pad at the side of the housing.

33. In a radio frequency communication handset comprising a housing, electronic circuitry located in the housing, the electronic circuitry including a controller, an antenna connected to the electronic circuitry, and a user interface connected to the electronic circuitry, wherein the improvement comprises:

the user interface comprising a combined navigation and selection input device, wherein the input device comprises a roller connected to the housing to provide at least two different movements of the roller, a first one of the movements comprising rotational movement of the roller about an axis of the roller, wherein the input device is adapted to send a first type of signal to the controller when the roller is moved in the first movement and a second type of signal when the roller is moved in a second one of the movements, wherein when the controller is in a first idle mode receipt of the second type of signal causes the controller to display a list of available operations on a display of the handset and, when the controller is in a second non-idle mode receipt of the second type of signal causes the controller to perform an operation based upon a highlighted or marked one of the operations displayed on the display.

34. In a radio frequency communication handset comprising a housing, electronic circuitry located in the housing, an antenna connected to the electronic circuitry, and a user

interface connected to the electronic circuitry, wherein the improvement comprises:

the user interface comprising a combined navigation and selection input device, wherein the input device comprises a roller connected to the housing to provide at least two different movements of the roller including rotation of the roller about a first axis of rotation and pivotable movement of the roller about a second different axis of rotation.--

REMARKS

1. This preliminary amendment cancels claims 2, and 22-27, amends claims 1, 3, 4, 6 and 11, and adds new claims 28-34. Claims 1, and 3-21 were removed from consideration in the parent application. Claims 1 and 3-21, are again placed into consideration by this preliminary amendment, along with the additional, newly added claims, 28-34. Support for all of these claims is found throughout the specification and drawings, as originally filed, and no new matter is added.

A favorable consideration of all of the now pending claims is earnestly solicited.

Please charge deposit account 16-1350 for any fee deficiency.

Respectfully submitted,

Geza C. Ziegler, Jr.
Reg. No. 44,004

4-5-00
Date

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Navigation key for a handset

Background of the Invention

The invention relates to a new and improved user interface (UI) for a telephone handset. The UI of hand portable phones for cellular or cordless systems does not just support the call handling alone. In the recent generations of hand portable phones more and more new applications have been integrated in the phones. One of the latest applications is web browsers, e.g. the one offered by Unwired Planet.

Navigation among the menu items, handling of the individual applications and editing of text as input for the applications are very difficult to perform, because the most commonly used type of navigation is carried out by an up/down scroll key. When pressing the key three times, the cursor moves three steps. Scrolling in this way through the menu or through the phone book is very time-consuming.

EP 463856 B suggests to substitute the scroll key with a roller ball or a thumb wheel. However, it is difficult to implement a roller ball known from a computer mouse into a hand portable phone. Today, the size of hand portable phones is comparable with the size of a mouse device for a computer.

However, a thumb wheel has now been implemented in a small portable phone, and this is described in EP 679003 A. This thumb wheel is placed in the upper left corner of the phone. The wheel is quite small, but the diameter still prohibits a more user-friendly positioning. In general, the user wants to operate the phone by using only one hand, but the position of the thumb wheel forces the user to use a two-hand grip - the right thumb for operating the keys on the front cover and the left thumb for operating the thumb wheel. This means that the user is not able to make a call from the phone book when he is carrying a bag or just writing with the other hand. Left-handed users are compelled to use a right-handed grip.

Summary of the Invention

In accordance with the invention there is provided a telephone handset having a front surface with a display and a keypad, wherein said keypad includes a group of keys for entering alphanumeric signs and a key for navigating a cursor in the display, said navigation key is placed in the front surface of the phone between the display and the group of alphanumeric keys, said navigation key includes a roller body which extends partly though an opening in the front surface of the phone, and which is essentially cylindrical with a length and diameter of the same size as the width of the keys in said group of keys for entering alphanumeric signs. With the roller concept according to the invention the roller body will have a well-defined axis of rotation, and by providing the roller body with a cylindrical shape a part of the micro mechanics may be placed internally in the roller.

The invention provides a new and improved user interface for a telephone handset, said user interface including a roller body for scrolling though the items in the display and allowing the user to handle it by a one-hand grip.

When the axis of rotation of the roller is provided such that it extends perpendicularly to the longitudinal axis of the phone, the scrolling through the items in the menu will be performed like the traditional scrolling, but the scrolling will be much faster. The user is allowed to slow down the speed of the scrolling when he is near the desired item.

When the keys are arranged such that the navigation key is placed as an extension of the central column of the group of keys for entering alphanumeric signs, the navigation key is positioned in the resting point for the thumb. This is ergonomically a very good solution.

The phone is provided with means for detecting the rolling and depression of the navigation key, and the output from the detection means is fed to the controller which moves the cursor between items displayed in the display in dependence on

the signal generated by the rolling and selects an item pointed out by the cursor in dependence on the signal generated by the depression.

The invention furthermore relates to a telephone handset having a front surface with a display and a keypad, wherein said keypad includes a key for navigating a cursor in the display controlled by a control unit. The navigation key is provided as a depressable roller body, and the control unit receives a first input signal representing the rolling of the roller body and a second input signal representing the pressing of the roller body for moving the cursor between items in the display and for selecting an item pointed out by the cursor, respectively. According to the invention the processor displays a list of available operations in the display upon pressing the roller body when the handset is in idle mode. Hereby it is possible to integrate a hot key or a power soft key functionality into the navigation key and to perform many of the most common operations by pressing and rolling this single navigation key. The power soft key list may be specified by the user.

The navigation key is very small according to the preferred embodiment, i.e. the length of said navigation key is of the order of 6-14 mm, and the maximum diameter of the roller body is of the order of 6-12 mm, thereby allowing the navigation key to be placed between the front cover of the phone and the main printed circuit board.

According to the preferred embodiment of the handset according the invention, the structure of the navigation key for providing control signals in dependence on the operation thereof comprises a roller body acting as a navigation key, a carrier for carrying said roller body, a supporting means supporting said carrier, said carrier being hinged relative to the supporting means by cooperating hinging parts, biasing means for urging the carrier and the supporting means away from each other at a distance from said hinging parts, and detection means for detecting a force counteracting the biasing force provided by said biasing means and for providing a second control signal in dependence thereon. Hereby it is ensured that the depression movement at the return movement is well-defined without any risk of the structure being locked unintentionally due to friction.

The carrier furthermore carries an encoder means aligned with the roller body for detecting the rotation of said body and for providing a first control signal in dependence thereon. According to the preferred embodiment of the invention the encoder means interacts with an electrical readable pattern provided on one end face of the roller body - actually the end face is protected by a surrounding collar partly protecting the engagement between the sliding shoe of the encoder and the electrical areas in said pattern.

The invention furthermore relates to a navigation key structure. The navigation key structure provides control signals in dependence on the operation of a roller body acting as a navigation key in the structure. The structure furthermore comprises a carrier for carrying said roller body, supporting means supporting said carrier, said carrier being hinged relatively to the supporting means by cooperating hinging parts. Biasing means is provided for urging the carrier and the supporting means away from each other at a distance from said hinging parts. Detection means is provided for detecting a force counteracting the biasing force provided by said biasing means and for providing a control signal in dependence thereon. Hereby it is ensured that the depression movement at the return movement is well-defined without any risk of the structure being locked unintentionally due to friction. Due to the architecture of the navigation key structure the overall size may be so small that the navigation key may be integrated in an existing UI concept for a phone, giving the user easy and substantially improved access to the functionality of the phone.

The roller body is arranged rotatably on a shaft part of the carrier, said shaft part being retained between two plate-shaped end parts, said end parts being furthermore adjoined by at least one beam-shaped leg part extending along the shaft part. Hereby the carrier is connected with the front cover/printed circuit board (the supporting means) via a hinged connection, and the roller is pivotally connected with the carrier. Hereby two pivotal movements are used, while the state of the art in general uses one pivotal movement and one linear movement. The two axes of rotation may advantageously be parallel.

The two plate-shaped end parts and said at least one beam-shaped leg part provide a stiff structure for the carrier. Preferably, the carrier comprises two leg parts in parallel with the shaft part, and the hinge part of the carrier extends outwardly from one of said leg parts.

The roller body is formed as a barrel having a through bore for receiving said shaft part. Internally, the diameter of the through bore of the roller member expands at one end of the member for providing the roller body with a cavity containing a cam-shaped disc member for cooperation with a spring member fixed to said shaft part, thereby defining a number of discrete positions allowable during the revolution of the roller body. The cam-shaped disc member acts as an end wall for the chamber and is provided with a central opening for the shaft part.

The carrier furthermore carries an encoder means aligned with the roller body for detecting the rotation of said body and for providing a control signal in dependence thereon. The encoder means interacts with a pattern readable by the encoder means, and said pattern is provided on the outer surface of the disc-shaped member.

The encoder unit according to the invention is adapted for use in a telephone handset having a navigation key which is provided as a roller body. The roller body is provided with a pattern which is readable by the encoder unit, and said roller body is allowed to adopt a predetermined number of valid states. Upon detection of a change of state for said roller body, the encoder unit actively checks whether the detected change of state is valid. Advantageously this is done by successively testing the contact between the sliding shoes and the pattern one by one, said testing being performed by applying a signal to one of the sliding shoes and detecting the response on the other sliding shoes. Hereby the contact between the sliding shoes may be tested and compared with a table including the valid states.

According to the invention a roller key structure is placed between a display and a group of alphanumeric keys and is used as a navigation key for a cursor in a display of a cellular or cordless phone, wherein the size of the part of said roller key that extends through the front cover of the phone corresponds to the general size of the keys in the group of alphanumeric keys.

Brief Description of the Drawings

Fig. 1 schematically illustrates a hand portable phone having a navigation key according to the invention.

Fig. 2 schematically shows the essential parts of a telephone for communication with a cellular or cordless network.

Fig. 3 illustrates a preferred embodiment of the roller key structure according to the invention.

Fig. 4 shows the roller key structure shown in fig. 3 from below.

Fig. 5 shows the roller key structure shown in fig. 3 in exploded view.

Fig. 6 schematically and in cross-section shows the part of the phone shown in fig. 1 including the navigation key according to the invention.

Fig. 7 schematically shows a circuit diagram showing the encoder concept according to the invention.

Fig. 8 shows how the switches in fig. 7 are opened and closed when turning the roller.

Fig. 9 shows a flow diagram illustrating the interrupt handling routine used for actively controlling state changes according to the invention.

Fig 10 shows the idle mode display and the power soft key menu display of the phone according to the invention.

Fig. 11 shows a diagram illustrating the mode of the phone according to the invention.

Detailed Description of the Invention

Fig. 1 shows a preferred embodiment of a phone according to the invention, and it will be seen that the phone, which is generally designated by 1, comprises a user interface having a keypad 2, a display 3, an on/off button 4, an earpiece 5, and a microphone 6. The phone 1 according to the preferred embodiment is adapted for communication via a cellular network, but could have been designed for a cordless network as well. The keypad 2 has a first group 7 of keys as alphanumeric keys, by means of which the user can enter a telephone number, write a text message (SMS), write a name (associated with the phone number), etc. Each of the twelve alphanumeric keys 7 is provided with a figure "0-9" or a sign "#" and "*", respectively. In alpha mode each key is associated with a number of letters and special signs used in the text editing.

The keypad 2 additionally comprises two soft keys 8, two call handling keys 9, a navigation key 10, a key 11 switching between alpha mode and numeric mode and a clear key 12.

The two soft keys 8 have a functionality corresponding to what is known from the phones Nokia 2110, Nokia 8110 and Nokia 3810. The functionality of the soft key depends on the state of the phone and the navigation in the menu by using a navigation key. The present functionality of the soft keys 8 is shown in separate fields in the display 3 just above the keys 8.

The two call handling keys 9 according to the preferred embodiment are used for establishing a call or a conference call, terminating a call or rejecting an incoming

call. The clear key 12 may be used e.g. for erasing the digit or letter entered last by brief depression, while depression of a longer duration will erase the entire number or word. The key 11 switches between alpha mode and numeric mode in a text editing mode.

The navigation key 10 is placed centrally on the front surface of the phone between the display 3 and the group of alphanumeric keys 7. Hereby the user will be able to control this key with his thumb. This is the best site to place an input key requiring precise motor movements. Many experienced phone users are used to one-hand handling. They place the phone in the hand between the finger tips and the palm of the hand. Hereby the thumb is free for inputting information.

The navigation key 10 includes a roller body 20 (see fig. 3) which extends partly though an opening in the front cover 21 of the phone, and said roller body 20 is essentially cylindrical with a length and diameter of the same size as the width of the keys in the alphanumeric group of keys 7. When the axis of rotation of the roller body 20 is provided such that it extends perpendicularly to the longitudinal axis of the phone 1, the rolling of the roller body 20 will move a cursor in the display in an up/down direction corresponding to the movement of the thumb. The navigation key structure is furthermore provided with a micro switch 22 for detecting the depression of the roller body 20, thereby providing a selection signal for the processor 17 indicating that the item pointed out in the display has been selected.

When the navigation key 10 is arranged as an extension of the central column of the alphanumeric keys 7, the navigation key can be accessed optimally by both left- and right-handed users.

Fig. 2 schematically shows the most important parts of a preferred embodiment of a portable phone, said parts being essential to the understanding of the invention. The preferred embodiment of the phone of the invention is adapted for use in connection with the GSM network, but, of course, the invention may also be applied in connection with other phone networks, such as cellular networks and various forms

of cordless phone systems. The microphone 6 records the user's speech, and the analog signals formed thereby are A/D converted in an A/D converter 15 before the speech is encoded in an audio codec unit 14. The encoded speech signal is transferred to a physical layer processor 17, which e.g. supports the GSM terminal software. The processor 17 also forms the interface to the peripheral units of the apparatus, including the memories (RAM, ROM), the display 3 and the keypad 2 (as well as SIM, data, power supply, etc.). The processor 17 communicates with the RF part 19 via a baseband converter 18 and a channel equalizer 16. The audio codec unit 14 speech-decodes the signal, which is transferred from the processor 17 to the earpiece 5 via a D/A converter 13. The units 13-18 are usually integrated in a chip set - either a commercially available one or in a set of specially designed chips (ASIC's).

The processor 17, which serves as the controller unit in a manner known per se in the preferred embodiment, is connected to the user interface. Thus, it is the processor which monitors the activity in the phone and controls the display 3 in response thereto.

Therefore, it is the processor 17 which detects the occurrence of a state change event and changes the state of the phone and thus the display text. A state change event may be caused by the user when he activates the keypad including the navigation key 20, and this type of events is called entry events or user events. However, also the network in communication with the phone may cause a state change event. This type of events and other events beyond the user's control are called non user events. Non user events comprise status change during call set-up, change in battery voltage, change in antenna conditions, message on reception of SMS, etc.

The roller key

The roller key according to the invention replaces the scroll key normally used by the applicant for moving the cursor in the display in an upward and a downward direction. The user may revolve the roller according to the invention to move the

cursor through a number of listed items in the display, and press the roller to select one of the displayed items.

According to the preferred embodiment the roller body will have twelve positions per revolution. Each of these twelve positions will be mechanically well-defined, and the user will have to provide a rolling force of a certain level (e.g. above 1 N) in order to come to the next discrete position. In the preferred embodiment the outer cylindrical surface of the roller key is provided with 12 axial slots for providing a better grip.

When pressing the roller, the required pressing force should be sufficient to avoid unintended selections during scrolling. The required selection force could be three times (e.g. above 3 N) the required rolling force.

Fig. 6 illustrates how the navigation key structure according to the invention is placed in a hand portable phone. The navigation key structure comprises a roller body 20 acting as a navigation key and a carrier 23 for carrying the roller body 20. The carrier 23 comprises a beam 29 carrying the stub shaft 28 as hinge parts, a beam 30 and a shaft 24 carrying the roller body 20. The two beams 29, 30 and the shaft 24 are parallel and are interconnected by bearings 31, 35 at each end.

A part of the roller body 20 extends through a close fitting opening (no contact) of the front cover 21 of the phone. The rear side of the front cover 21 is provided with two gripping arms 27 having U-shaped recesses 34 for receiving stub shafts 28, thereby, as a supporting means, defining a hinge axis for the carrier 23. The gripping arms 27 act as spacer members between the front cover 21 of the phone and the printed circuit board (PCB) 25. The latter constitutes a locking member for the shaft bearing provided by the recesses 34 of the gripping arms 27. The distance between the gripping arms 27 is slightly smaller than the length of a shaft body 24 to avoid axial displacement of the carrier 23.

A spring 26 is provided as a biasing means for urging the carrier 23 away from the printed circuit board 25 towards the front cover 21 of the phone. The front cover 21

is provided with two stop legs 32 which cooperate with an upper surface of the part 30 of the carrier facing away from the hinge 28,34. The lower surface of carrier part 30 is adapted for cooperation with a micro switch 33. The distance between the contact faces on the micro switch 33 and the stop legs 32 is slightly greater (preferably about 0.5 mm compared with the full width of the structure which is about 15-20 mm) than the thickness of the corresponding carrier part. The coil 26 urges the carrier 23 towards the stop legs 32. When the user depresses the roller with a force greater than the coil force (e.g. 3 N corresponding to appox. 300 g), the carrier will be urged against the micro switch 33 giving an output signal in dependence thereon. The micro switch 33 acts as a detection means for detecting the force counteracting the biasing force provided by the coil 26.

When the roller body 20 is depressed, the whole navigation key structure performs a swing movement around the hinge axis defined by the gripping means 28, 34.

The preferred embodiment of the navigation key structure according to the invention is shown in figs. 3-5. Fig. 5 shows the individual parts of the navigation key structure. The main body of the carrier 23 is provided as an integral body by injection molding and comprises a plate-shaped end part with a central bore 38 as a bearing 31. One beam 29 extending from the bearing 31 is provided with a projection 37 carrying the stub shafts 28. The end face of the beam 29 is provided with a slot 43, and a locking recess is provided in the central part of the bottom of the slot 43. During the assembly of the structure a barbed tongue 44 on a metallic locking member 45 is received permanently in the locking recess.

The other beam 30 extending from the bearing 31 is provided with a locking pin 36 at the end face, said locking pin 36 being received through a locking hole 46 on the locking member during the assembly of the structure. When assembled, the pin 36 is heated and deformed so that the locking member 45 is locked permanently to the carrier 23.

One end 47 of the shaft 24 is provided with a stepwise decreasing diameter. The tip of this end 47 is adapted to be received in the bore 38 during assembly. The first shoulder of the shaft end 47 engages the bearing 31, and the second shoulder engages a corresponding part internally in the roller body 20 which prevents axial displacement of the body 20 in relation to the shaft 24.

The other end of the shaft 24 is provided with a locking segment 40 on which a metallic disc 48 is received. The disc 48 has two semi-circular slots 49 whereby an outer ring of the disc is provided with resilient properties. During stamping of the disc 48 a knob 50 is provided on this outer ring.

Next to the locking segment 40 there is provided a cylindrical segment 41 on which a plate-shaped plastics member 51 is placed. The plate-shaped member 51 has a central bushing 52 engaging the cylindrical segment 41 of the shaft 24, an outer bushing 53 having a wave-shaped cam part 54 facing towards the metallic disc 48, and a disc part having a pattern of conducting areas 56 and non-conducting areas 55. In the preferred embodiment these areas are provided as a ring-shaped area divided into eight angular segments (60° conducting segment 56 and 30° non conducting segment 55 and so on). The conducting segments 56 are interconnected via the central part of the disc.

The metallic pattern 56 is a part of the encoder for the roller, and the plate-shaped plastics member 51 and the metallic disc 48 are received in a cavity 57 provided in the roller body 20, in which four co-axial beams 58 fix the member 51 in relation to the roller 20.

An encoder unit 59 has a circular disc member 60 acting as an end wall for the internal cavity 57 in the roller body 20 containing the cam-shaped disc member 51, the spring member 48 and the shaft 24. The encoder unit 59 comprises a main body 65 and a terminal part 62.

These two parts are provided with three metallic strips 64 as resilient connectors by injection molding. From the disc member 60, one end of each of these three strips 64 acts as a sliding shoe acting as an encoder terminal in electrical contact with the pattern of conducting area 56. From the disc member side, the three strips 64 pass through the main body 65 to the opposite wall and into the terminal part 62. The central parts of the strips 64 act as springs between the main body 65 and the terminal part 62. The other ends of the metallic strips 64 act as terminal parts in a ball grid array like connector (fig. 4), the connection being achieved by pressing the terminal part 62 towards corresponding pads on the printed circuit board 25.

Even though it is not shown, a person skilled in the art will understand how an appropriate projection corresponding to the gripping arms 27 extends from the inner surface of the front cover 21 and urges the terminal part 62 towards the printed circuit board 25. Hereby the main body 65 is allowed to travel the about 0,3-0,5 mm when the roller is depressed, without affecting the connections.

It will appear from the description how the encoder is able to detect when the roller body 20 has been turned. The encoder unit 59 further comprises a locking hole 61 aligned with the locking hole 46, and a shaft hole 63 with a profile corresponding to the cross-section of a locking segment 42 of the shaft 24.

When the parts of the roller body 20 have been assembled, an axial force is applied to some part of the assembly. Hereby the barbed tongue 44 is urged into the slot 43, and the locking pins 36, 39 are plastically deformed to avoid disassembly of the body 20. This can be seen from fig. 3. It appears from fig. 4 that the spring 26 according to the preferred embodiment is provided as a resilient metal strip anchored in the beam 30 actuating the micro switch 33. As will be seen, the spring 26 is placed in a track between two spacer members 66 protecting the micro switch 33.

The encoder

According to the preferred embodiment the three terminals travel along a circle inside the segmented pattern 55, 56. With an angular spacing between the terminals of the size of 30° +/- a multiple of 90°, this will give 12 states of 30° width per full turn of the roller 20. The knob 50 and the wave-shaped cam member 54 have to be designed so that the force acting on the resilient ring is minimum in the central part of the 30° interval. The roller may hereby obtain unstable equilibriums centrally in the twelve discrete positions corresponding to the twelve states.

By detecting the relative connection between the metallic strips 64 the processor 17 is able to detect the movement of the roller body 20. When the roller is rolled, the metallic strips 64 are successively interconnected via the pattern of conductive and non conductive areas 55, 56 provided on the outer surface of the disc-shaped member 51.

As will be seen from fig. 8, the sliding shoes 76-78 (contact springs) of the metallic strips 64 each slide along a circular path 75. According to the preferred embodiment the three paths are coincident. It is furthermore shown how the three sliding shoes 76-78 have relative angular spacings corresponding to 60°. One of the three sliding shoes is not connected to the other two via the conducting area 56. With twelve states per full turn a state is provided as a 30° segment. The angular spacing between the first and second sliding shoes, e.g. 76 and 78, has to be 30° (corresponding to contact in different segments) plus N x 90° (a full turn corresponds to four identical periods each containing three states), and here the angular spacing is 120°. The angular spacing between the first and third sliding shoes 76, 77 has to be 60° (corresponding to contact in different segments - also differing from the segment of the second sliding shoe) plus M x 90°, and here the angular spacing is 60°.

Based on this, the pattern in table 1 represents the expected reading from the switches S_A, S_B and S_C in the encoder. A switch is open when the corresponding sliding shoe 76-78 contacts a non conductive area 55 and closed when the sliding shoe 76-78 contacts a conductive area 56.

Segment	Angle interval	S_A	S_B	S_C
1	0°-30°	open	closed	closed
2	30°-60°	closed	open	closed
3	60°-90°	closed	closed	open
4	90°-120°	open	closed	closed
5	120°-150°	closed	open	closed
6	150°-180°	closed	closed	open
7	180°-210°	open	closed	closed
8	210°-240°	closed	open	closed
9	240°-270°	closed	closed	open
10	270°-300°	open	closed	closed
11	300°-330°	closed	open	closed
12	330°-360°	closed	closed	open

Table 1.

According to the invention the processor 17 actively checks whether the read pattern is valid or not. This is necessary because the roller body 20, when the whole roller assembly 20, 23 is pressed, might turn slightly. Due to the size of the overall structure this may cause one of the sliding shoes 76-78 to move onto dust particles and thereby lose contact. If such a situation is not detected, this may cause the cursor 72 in the menu to move one step up or down just before the selection. This will result in an activation of a wrong application.

To avoid such erroneous detections, the processor 17 according to the invention initiates a basic software routine to determine the position of the roller. The processor 17 is connected to the encoder via an ASIC 100. The ASIC 100 includes three identical circuits - one for each encoder switch S_A, S_B and S_C. Each of these circuits contains a drive part 102 for driving the corresponding sliding shoe 76-78 logical high or low. A pull-up circuit 101 pulls the voltage level up to an appropriate level, and an amplifier 103 amplifies the output from the sliding shoe for further processing. The three ASIC pins are connected to the switches S_A, S_B and S_C via respective RC circuits (filters).

When the processor 17 detects a turning of the roller via a change on the output V_A, V_B and V_C, it starts (step 110) an interrupt handling routine. In step 111 all the three

pins from the ASIC 100 are driven high by the drive circuits 102, and the pin corresponding to the sliding shoe in the switch S_A is driven low. Then the logical state of the other two pins is read. In steps 112 and 113 the same procedure as in step 111 takes place, except that it is the pins corresponding to the sliding shoes in the switches S_B and S_C that are successively driven low followed by a reading of the other two states.

In segments 4-6 in table 1 the sliding shoes of the switch S_A, S_B and S_C are successively in contact with the non conducting area 55, and therefore the interrupt handling routine would give the readings of table 2.

Segment	interrupt handling routine	S_A	S_B	S_C	output
4	step 111	drive low	high	high	
	step 112	high	drive low	low	
	step 113	high	low	drive low	
	step 115				3->4
5	step 111	drive low	high	low	
	step 112	high	drive low	high	
	step 113	low	high	drive low	
	step 115				4->5
6	step 111	drive low	low	high	
	step 112	low	drive low	high	
	step 113	high	high	drive low	
	step 115				5->6

Table 2.

It will be seen from table 2 that driving a sliding shoe 76-78 low when it is connected to a non conducting area 55 does not affect the logical state of the other pins. When two pins are connected to each other via the conducting area 56, driving one of these pins low will cause the other to go low too.

In the described embodiment the three patterns corresponding to the segments 4-6 in table 2 are the only three valid patterns. In step 114 the processor 17 checks whether the pattern determined by the readings in steps 111-113 is a valid pattern - if not the processor 17 in step 115 recognizes the turning that initiated the routine as

being a false alarm and deems the roller not to be turned. Then the processor 17 in step 118 starts waiting for the turning detection to initiate the routine once more.

If the pattern in step 114 is recognized as being a valid pattern, the processor 17 in step 117 compares the pattern with the pattern for the old state to determine whether the roller is turned in an upward or a downward direction. The new state is identified in dependence on this, and the processor 17 moves the cursor 72 in the display accordingly. Then the processor 17 in step 118 starts waiting for the turning detection to initiate the routine once more.

An invalid pattern is regarded as a fault situation and is not used for the cursor navigation. Instead the processor 17 waits for the next valid reading and then uses this for the cursor navigation. Confirmation or selection is performed by pressing the entire roller assembly, and this activates a key (the micro switch 33) in the keyboard assembly of the phone.

According to the preferred embodiment of the phone, the maximum rotation rate of the roller body 20 is expected to be around twenty state changes per second.

<u>**The functionality of the roller key**</u>

In addition to the navigation in the menu and in the phone book of the phone, the roller according to the preferred embodiment of the invention may be handled as a third soft key (power soft key) that contains user-defined options and thereby the favorite options of the user. The power soft key can be defined to fit the specific requirements of the user. It should for instance be possible to define the power soft key to be an easy dial key, entering a certain menu, toggling ringing on/off, etc. Compared with the generally used UI concept of the applicant known from Nokia 2110, Nokia 8110 and Nokia 3810, the power soft key will replace the up/down scroll key and act as a central soft key.

According to the preferred embodiment of the invention the power soft key will only be present in idle mode, which means not in menu, memory, etc. Hereby the power soft key will not be available during dialogue - either speech or data.

In idle mode of the phone, pressing the roller key 20 is used for accessing a so-called "roller menu". The "roller menu" is an improvement of the "power soft key" or "hot key" known per se, and, according to the preferred embodiment, contains important functions as well as a number of user-defined favorite operations.

The "roller menu" hence has some main advantages. First of all the "roller menu" provides very easy access to re-dial list, phone book and menu functions - solely using the roller. Furthermore, the user is allowed to personalize his phone, which means offering an easy accessible list e.g. containing his favorite menus, web addresses, name entries or user-friendly access to voice dialing.

Furthermore, the "roller menu" makes it easier for the user to understand that the roller key 20 contains access to voice dialing, just as it makes the addition and the deletion of favorite items more obvious and thereby the menu more dynamic.

When the cellular phone according to the invention is in idle mode, the display 3 may advantageously look as the upper image of fig. 10. An upper row in the display contains predefined icons indicating certain conditions of the phone, e.g. the envelope indicates that the phone has received an SMS message not yet read. Other icons may indicate the reception of voice mail, status of alphanumeric keypad, data transmission, etc. Time is displayed in the top right corner.

The display has two vertical status bars - the left one indicates the signal strength and the right one indicates the battery level. The name or logo of the present network operator is displayed in the central part of the display. At the bottom of the display two fields 68 display the present functionality of the soft keys 8, and between these two fields a separate icon 69 indicates that pressing the navigation key 10 gives access to the power key functionality.

When the power soft key functionality is placed in the roller navigation key 10 just below the display 3, the user gets a superb indication by the icon 69 that the navigation key 10 contains the power key functionality known per se. The use of the roller key having scrolling and selection functionality as a power soft key gives the user a superb opportunity to handle the major part of the activities with only one button. The use of a roller key as a navigation key just below the display gives the phone extraordinarily good qualities for one-handed use.

It should be noted that the power soft key icon 69 and functionality is only present in idle mode, while the navigation key 10 is used for navigation and selection purposes in the other modes.

Upon pressing of the navigation key 10, the phone enters the power soft key mode, and a user-defined list 70 containing the favorite operations of the user is displayed. The list is named "favorites", and the name is displayed at the top of the list. The first item in the list is marked by a cursor 72, which can be moved by rolling the navigation key 10, and the item pointed out may be selected by depressing the same key 10.

The user can scroll in the list and select a certain item by pressing the roller. Selection of the "menu" item will for instance enter the normal menu structure. The power soft key defines links or short-cuts to operations in the phone book or in the menu.

The power soft key menu may contain some user-defined favorite operations, and may advantageously contain three further items "re-dial", "names" and "menu".

Re-dial

This item allows the user to re-dial the last dialed number, and/or to view the complete re-dial list. When the re-dial item is highlighted, the user has several

options. By pressing the send key 9 or by long-pressing (for longer than e.g. 0.8 sec) the navigation key 10 the last dialed number is immediately re-dialed.

By pressing the navigation key 10 shortly, the complete re-dial list will be entered. From here, the user can scroll through the re-dial list with the navigation key 10, and then press the send key 9 or long-press the navigation key 10 to launch the call.

The re-dial functionality is provided in the power soft key menu, because it is desired to have easy one-hand access to this very basic function.

Name

Selection of this power soft key menu item with the navigation key 10 will access the normal names list (phone book) in the same way as pressing the "names" soft key 8 in idle mode (see fig. 10, first image). Again, it is possible via "names" to highlight a name/phone number in the names list/phone book and to establish a call to the highlighted name/phone number by operating the navigation key 10 alone.

Menu

Selection of this power soft key menu item with the navigation key 10 will enter the normal menu structure in the same way as pressing the "menu" soft key 8 in idle mode (see fig. 10, first image).

This "names" item and the "menu" item are duplicated here to allow the user to perform any operation with the navigation key 10.

Easy Dial

The easy dial item as default does not have any function, but is a user-friendly and obvious way for the user to define specific numbers to call when selecting this item. As long as the easy dial item has not been defined, the item will appear as "(easy dial)" in the power soft key menu, as indicated in fig. 10.

When the easy dial number is highlighted by the cursor, but has not yet been defined, the first option on the left soft key may advantageously be define instead of select.

Options on left soft key in roller menu

In the power soft key menu, the left soft key 9 is called "options". The option key accesses a list when selected, and this list allows the user to handle operations on the highlighted power soft key menu item, and it allows the user to add new favorite/bookmark items to the power soft key menu. The options list is a standard selection list, and the different options are described in the following.

Select/Call

The first option on the left soft key 9 in the power soft key menu depends on what item is currently highlighted in the roller menu. If e.g. "menu", "names" or another selectable item is highlighted, the first option is "select". If a specific number, or the "re-dial" item is highlighted, the first option will be "call".

Add favorite

This item allows the user to add one of his own favorite functions to the power soft key menu. The added favorite will be added after the currently highlighted item in the power soft key menu.

Re-define

This item allows the user to re-define the current power soft key menu item to another one. This is basically handled in the same way as adding a new favorite to the power soft key menu, except that the selected item will replace the currently highlighted item.

When "re-define" is selected, the type of the currently highlighted power soft key menu item will be suggested as default in the favorites selection list. This

means that if e.g. the user re-defines an easy dial number, then the default highlighted favorite option type will be "easy dial".

Move to top

This item allows the user to customize the ordering of the power soft key menu. When the "move to top" item is selected, the currently highlighted power soft key menu item will be moved to the very top of the power soft key menu.

By doing this repeatedly for several items, the user can customize the power soft key menu.

Remove

This item allows the user to remove an item from the power soft key menu. Preferably, the user will be asked to confirm the removal. The user can also remove the "standard" items in the power soft key menu, e.g. "re-dial", and add them again, if needed.

Re-name

The "re-name" item allows the user to customize the power soft key menu, too. This is handled using the normal text editing windows, with the previous name as default, the editor limiting the maximum text to be entered to the screen width. The user can of course also re-name the "standard" items in the power soft key menu, e.g. "re-dial".

Assigning favorites to the power soft key menu

The user is allowed to add a certain number (e.g. 20) of his own personal favorite features, numbers and bookmarks to the power soft key menu. With the present display size, e.g. four items could be displayed and the remaining number of operations is accessible by rolling the navigation key 10. As mentioned, the editing of the power soft key menu list is performed by the left "option" soft key 9 once the menu has been entered. The menu is escaped by pressing the right "exit" soft key 9.

In table 1 some examples of relevant menus are given.

Favorite item	Operation when selected
Network	Enter network type selection (dual mode phones)
Easy dial	Calling an entry from the memory
Call mailbox	Actually a sub-set of the above
Prev ringing vol	Toggling ringing volume between two settings. The user can define both settings. One setting is default silent
Prev alert type	Toggling between silent and normal sound mode. Ringing and beep settings are muted or set to some pre-specified reasonable values, respectively
Write SMS	
Read SMS	
Last dialed calls	View last dialed calls list
Timer/costs	View last or all call timer/costs
Calculator	Direct access to calculator
Calendar	Direct access to calendar
Key tones on/off	
Lights on/off	
Light on for 20 sec.	Like on/off key
View last dial list	
Divert on/off	A divert to a user-defined phone number can be switched on and off. The user can also define divert type(s) (specific type, unconditional, all conditional, fax, data)
Prev diverts	Toggle between two diverts. The user can specify two phone numbers to divert to, and he specifies what divert type the diverts should be

Table 1.

In general, everything possible in the menu and the phone book can be entered as items in the power soft key menu. One may regard the power soft key as a one level representation of the frequently used operations in the multi-level tree structure of the operations known per se in the menu of the phone.

Modes of the phone

When the phone is in idle mode, the basic activity of the phone is to monitor the network activities and the UI of the phone itself. In idle mode (120 in fig. 11) the phone may display the idle mode display of fig. 10.

When the user starts activating the alphanumeric keys 7, the phone enters a call handling mode 122 in which the phone is able to establish a call based on the entered number.

If, instead, the user presses the right soft key 8 in idle mode, the phone will enter a standard menu mode 123 in which all applications available in the phone will be available in a tree structure. These applications may include messages (including e.g. SMS messages and E-mails), a call register (including ingoing and outgoing calls and missed calls), access to a calculator and games, access to call divert settings, clock and phone setting and access to the phone book.

By pressing the left soft key 8 the user may enter the phone book mode 124 which is also available via the standard menu mode 123. In general, the user is able to jump between the modes 122, 123 and 124, e.g. for storing a phone number (entered in the call handling mode 122) in the phone book (mode 124) for finally sending an SMS message (mode 123). These three modes may be escaped by pressing the clear key 11, causing the phone to return to idle mode 120.

When, from idle mode 120, the user presses the navigation key 10 (roller key), the phone enters a power soft key mode 121 from which the user may enter a number of applications available in the phone in the phone book or in the menu or just to handle a call. The power soft key menu 70 is a user-specified list of short-cuts to applications available in a complex menu structure of the phone. The number of items is specified by the user, too.

What is claimed is:-

1. A telephone handset having a front surface with a display and a keypad, wherein said keypad includes a group of keys for entering alphanumeric signs and a key for navigating a cursor in the display,

-said navigation key is placed in the front surface of the phone between the display and the group of alphanumeric keys,

-said navigation key includes a roller body which extends partly though an opening in the front surface of the phone, and which is essentially cylindrical with a length and diameter of the same size as the width of the keys in said group of keys for entering alphanumeric signs.

2. A telephone handset according to claim 1, wherein the axis of rotation of the roller extends perpendicularly to the longitudinal axis of the phone.

3. A telephone handset according to claims 1, wherein the keys in said group of keys for entering alphanumeric signs are arranged in three columns each having four keys, and said navigation key is placed as an extension of the central column.

4. A telephone handset according to claims 1, and furthermore comprising:

-a first detection means for detecting the rotation of the roller and for providing a first control signal for the controller,

-a second detection means for detecting the depression of the roller and for providing a second control signal for the controller, and

-said controller moving the cursor between items displayed in the display in dependence on the first control signal and selecting an item pointed out by the cursor in dependence on the second control signal.

5. A telephone handset according to claims 1, wherein the length of said navigation key is of the order of 6-14 mm, and the maximum diameter of the roller body is of the order of 6-12 mm.

6. A telephone handset according to claim 1, wherein the structure of the navigation key for providing control signals in dependence on the operation thereof, comprises:

- a roller body acting as a navigation key;
- a carrier for carrying said roller body;
- a supporting means supporting said carrier;
- said carrier being hinged relatively to the supporting means by cooperating hinging parts;
- biasing means for urging the carrier and the supporting means away from each other at a distance from said hinging parts; and
- detection means for detecting a force counteracting the biasing force provided by said biasing means and for providing a second control signal in dependence thereon.

7. A telephone handset according to claim 6, wherein the carrier furthermore carries an encoder means aligned with the roller body for detecting the rotation of said body and for providing a first control signal in dependence thereon.

8. A telephone handset having a front surface with a display and a keypad, wherein said keypad includes a key for navigating a cursor in the display controlled by a control unit,
-said navigation key is provided as a depressable roller body,
- said control unit receives a first input signal representing the rolling of the roller body and a second input signal representing the pressing of the roller body for moving the cursor between items in the display and for selecting an item pointed out by the cursor, respectively; and
-said processor displays a list of available operations in the display upon pressing of the roller body when the handset is in idle mode.

9. A telephone handset according to claim 8, wherein the items contained in the displayed list may be specified by the user.

10. A telephone handset according to claim 9, wherein the user may copy operations and applications available from the standard menu structure of the phone into the user-defined list.

11. A navigation key structure for providing control signals in dependence on the operation thereof, and comprising:

- a roller body acting as a navigation key;
- a carrier for carrying said roller body;
- said carrier being supported by supporting means;
- said carrier being hinged relatively to the supporting means by cooperating hinging parts;
- biasing means for urging the carrier and the supporting means away from each other at a distance from said hinging parts; and
- detection means for detecting a force counteracting the biasing force provided by said biasing means and for providing a control signal in dependence thereon.

12. A navigation key structure according to claim 11, wherein the carrier comprises a shaft part retained between two plate-shaped end parts, said roller body is arranged rotatably on said shaft part, and said end parts are furthermore adjoined by at least one beam-shaped leg part extending along the shaft part.

13. A navigation key structure according to claim 12, wherein the carrier comprising said shaft part, said two plate-shaped end parts and said at least one beam-shaped leg part provides a stiff structure.

14. A navigation key structure according to claim 13, wherein the carrier comprises two leg parts in parallel with the shaft part, and the hinge part of the carrier extends outwardly from one of said leg parts.

15. A navigation key structure according to claim 12, wherein the roller body is shaped as a barrel having a through bore for pivotal reception of said shaft part.

16. A navigation key structure according to claim 14, wherein the roller body is provided with a cam-shaped disc member for cooperation with a spring member

fixed to said shaft part, thereby defining a number of discrete positions allowable during the revolution of the roller body.

17. A navigation key structure according to claim 16, wherein the diameter of the through bore of the roller member expands at one end of the member for providing an internal chamber in the roller body containing said cam-shaped disc member and said spring member.

18. A navigation key structure according to claim 17, wherein said cam-shaped disc member is received in the through bore of the roller member and acts as end wall for said chamber, said disc member being provided with a central opening for the shaft part.

19. A navigation key structure according to claim 11, wherein the carrier furthermore carries an encoder means aligned with the roller body for detecting the rotation of said body and for providing a control signal in dependence thereon.

20. A navigation key structure according to claim 18, wherein the outer surface of the disc-shaped member is provided with a pattern readable by the encoder means.

21. A navigation key structure according to claim 20, wherein the outer surface of the disc-shaped member is provided with a pattern which is readable by the encoder means.

22. A front cover for a phone having an opening though which keys of a keypad extend, the back side of said front cover being furthermore provided with gripping means to allow, in cooperation with the printed circuit board of the phone, a separate navigation key structure to be depressed to perform a swing movement around the hinge axis defined by the gripping means.

23. Use of a roller key structure placed between a display and a group of alphanumeric keys as a navigation key for a cursor in a display of a cellular or

cordless phone, wherein the size of the part of said roller key that extends through the front cover of the phone corresponds to the general size of the keys in the group of alphanumeric keys.

24. An encoder unit for use in a telephone handset having a navigation key which is provided as a roller body, said roller body being provided with a pattern which is readable by the encoder unit, and said roller body being allowed to adopt a predetermined number of valid states, wherein, upon detection of a change of state for said roller body, the encoder unit actively checks whether the detected change of state is valid.

25. An encoder unit according to claim 24, wherein the pattern provided on the roller body is provided as metallic areas on an insulating surface, and the encoder unit is provided with a number of sliding shoes sliding over the pattern upon turning of the roller body.

26. An encoder unit according to claim 25, wherein the detected contact between the sliding shoes and the pattern is validated by successively testing the contact between the sliding shoes and the pattern one by one, said testing being performed by applying a signal to one of the sliding shoes and detecting the response on the other sliding shoes.

27. An encoder unit according to claim 26, wherein the encoder unit has three sliding shoes.

Navigation key for a handset

ABSTRACT

A telephone handset comprises a front surface with a display and a keypad. The keypad includes a group of keys for entering alphanumeric signs and a key for navigating a cursor in the display. The navigation key is placed in the front surface of the phone between the display and the group of alphanumeric keys, and it includes a roller body which extends partly though an opening in the front surface of the phone. The roller body is essentially cylindrical with a length and diameter of the same size as the width of the keys in said group of keys for entering alphanumeric signs.

Fig. 3.

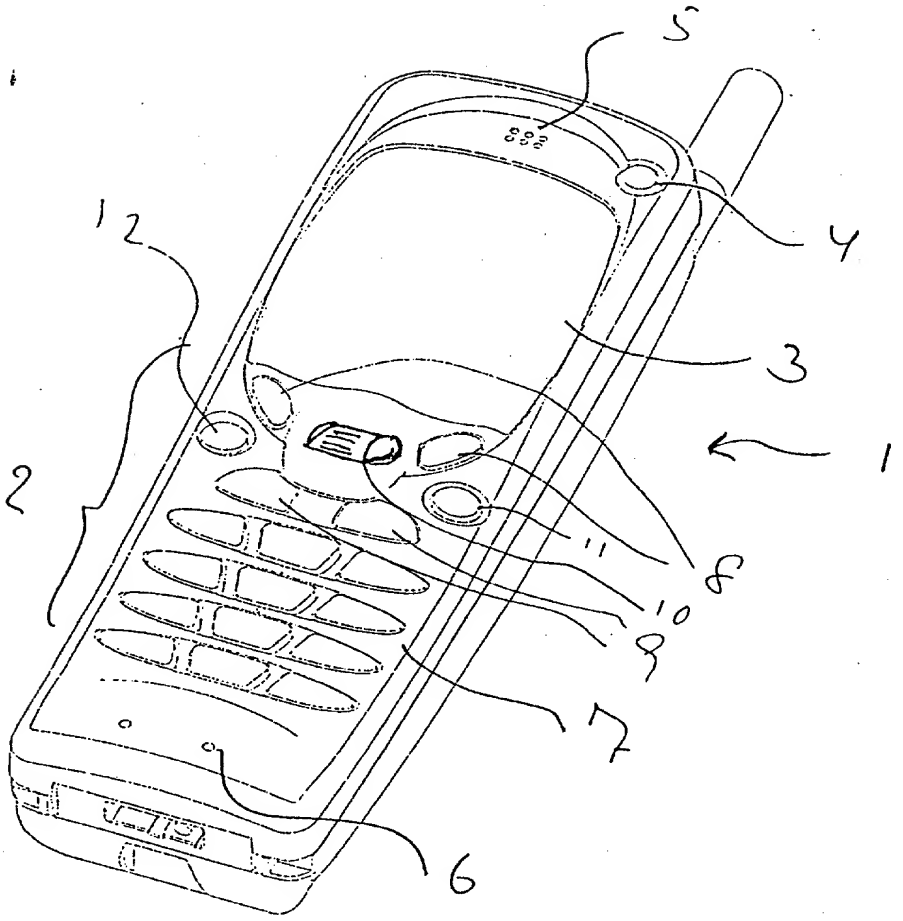
5
12
4
3
1
2
11
8
10
9
7
6

Fig 1

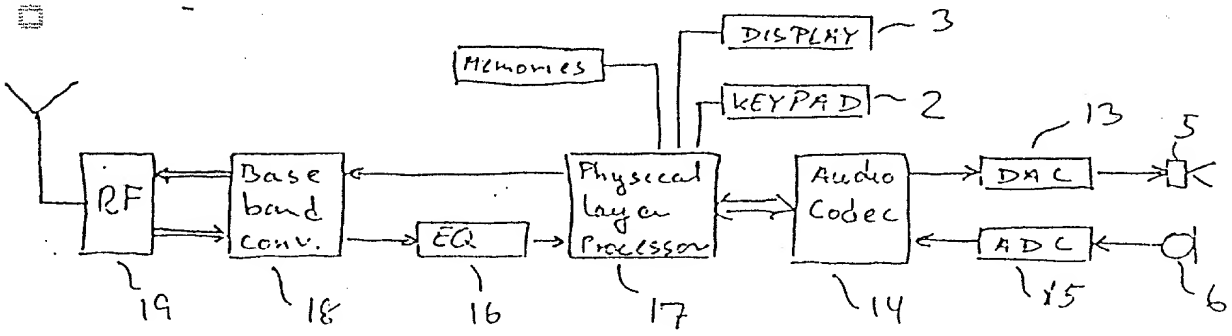
DISPLAY
3
Memories
KEYPAD
2
13
5
RF
Base band conv.
EQ
Physical Layer Processor
Audio Codec
DAC
ADC
19
18
16
17
14
15
6

Fig 2.

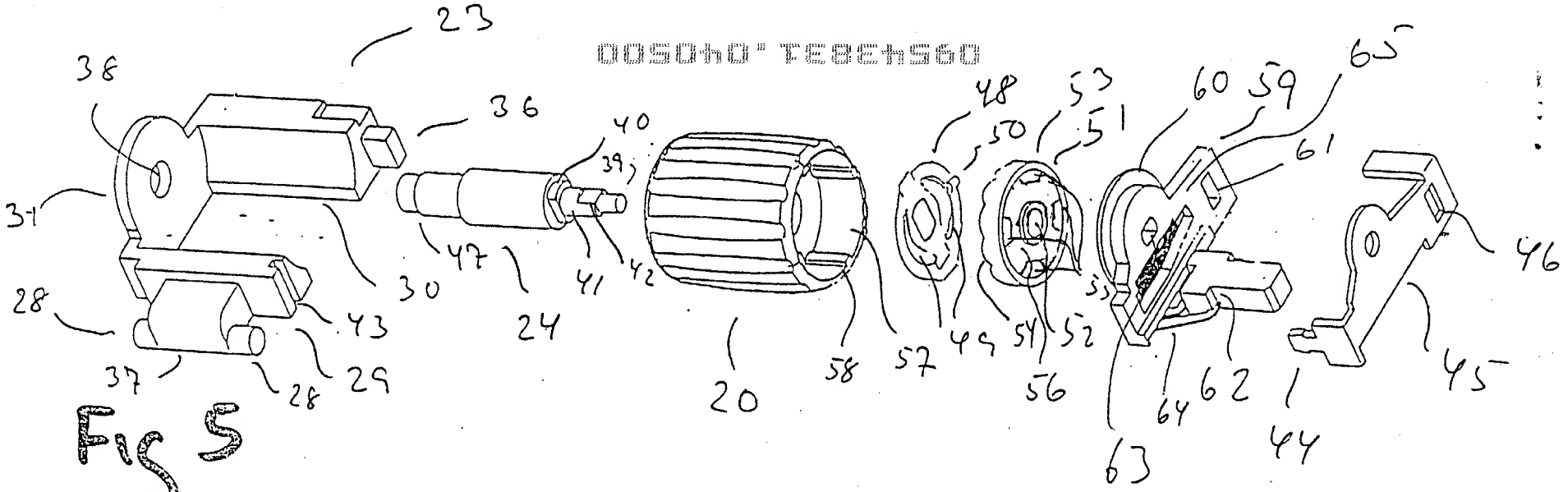

Fig 5

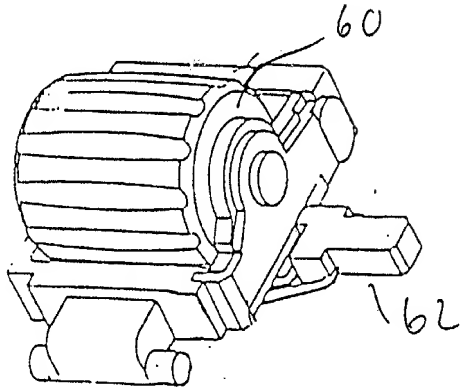

Fig 3

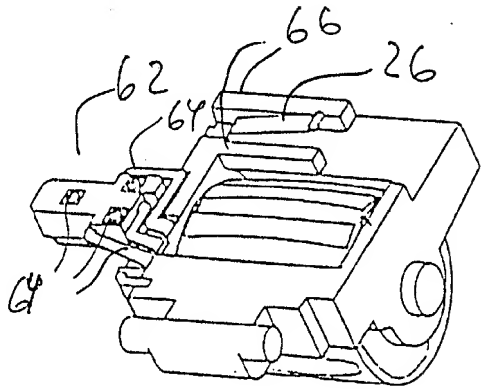

Fig 4

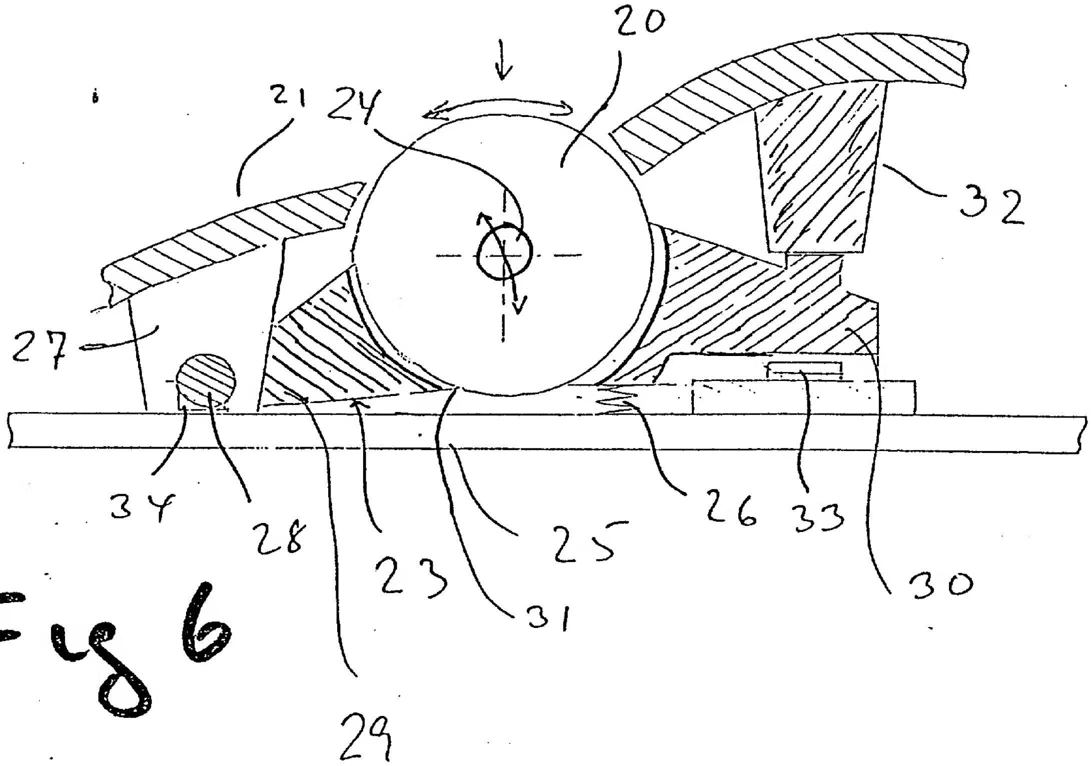

Fig 6

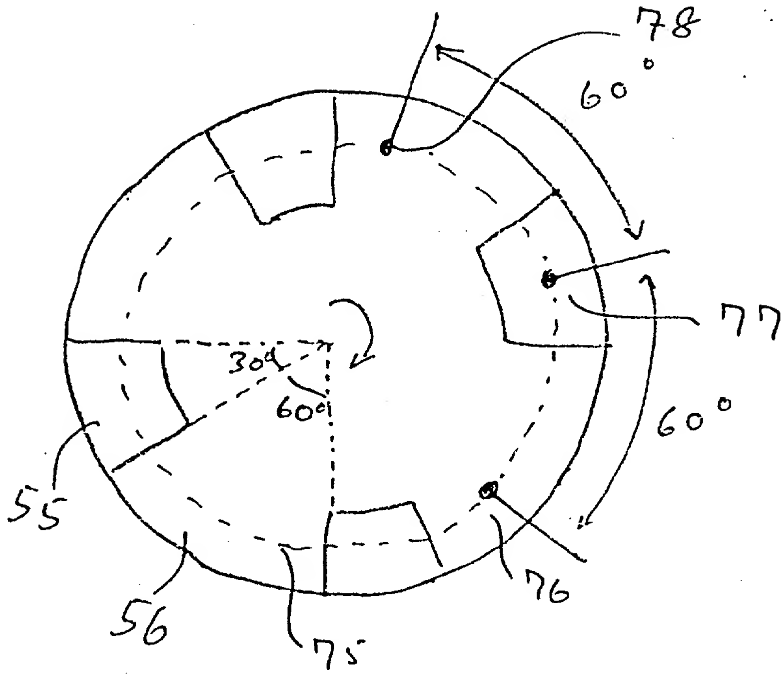
78
60°
77
60°
30°
60°
55
56
75
76

Fig 8

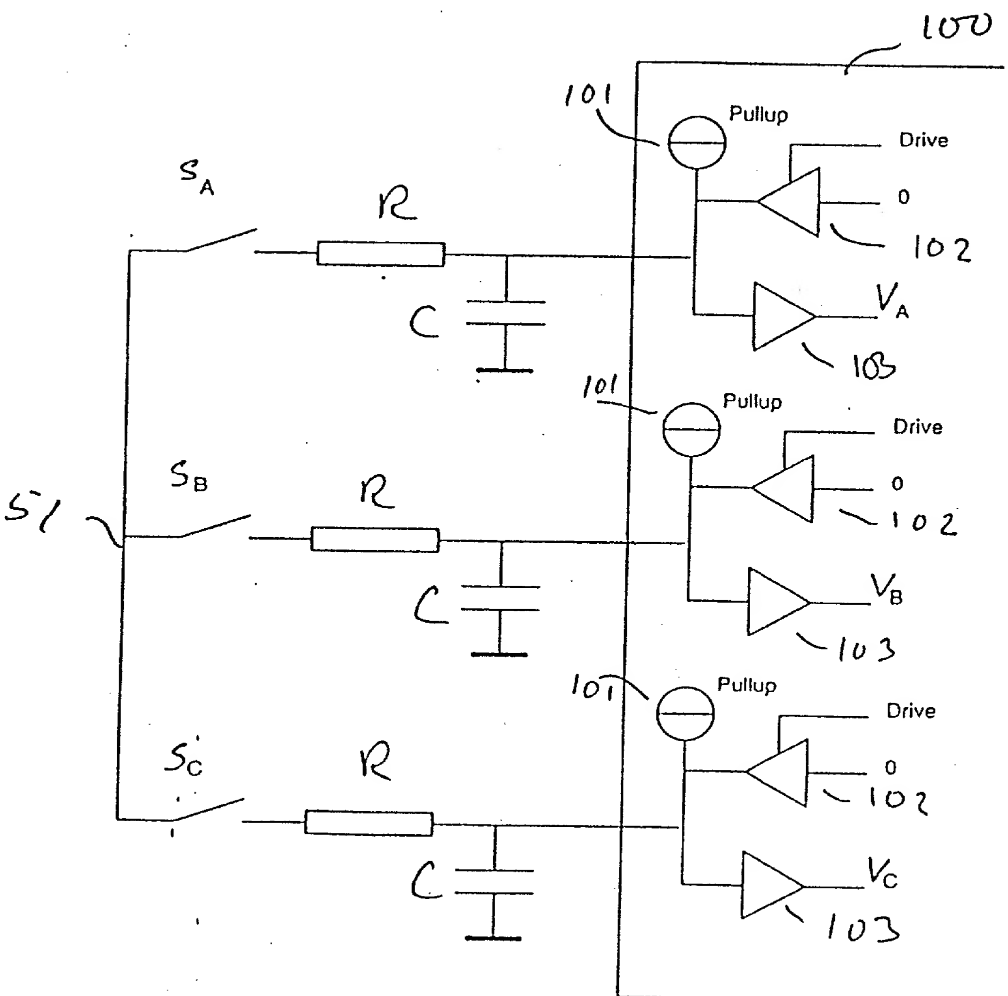
100
101
Pullup
Drive
0
102
V_A
103
S_A
R
C
S_B
V_B
S_C
V_C
51

Fig 7

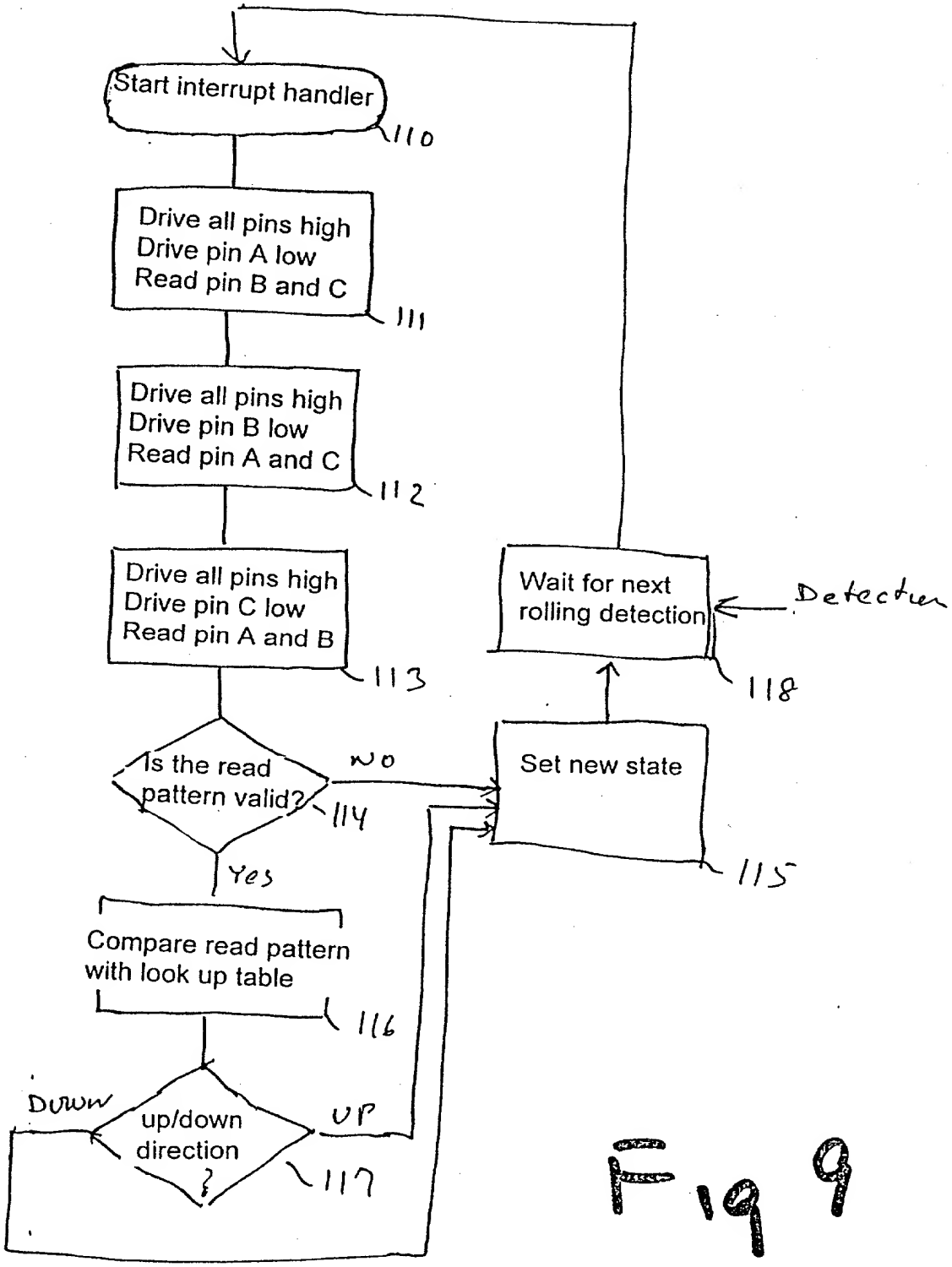

Fig 9

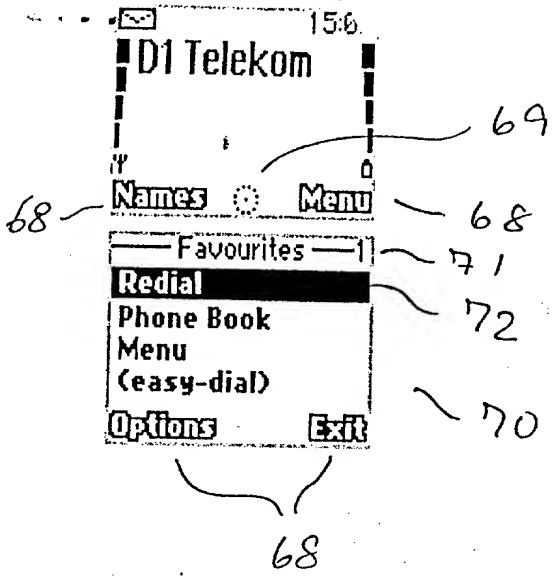
15:6
D1 Telekom
Names
Menu
Favourites
Redial
Phone Book
Menu
(easy-dial)
Options
Exit
68
69
68
68
71
72
70
68

Fig 10

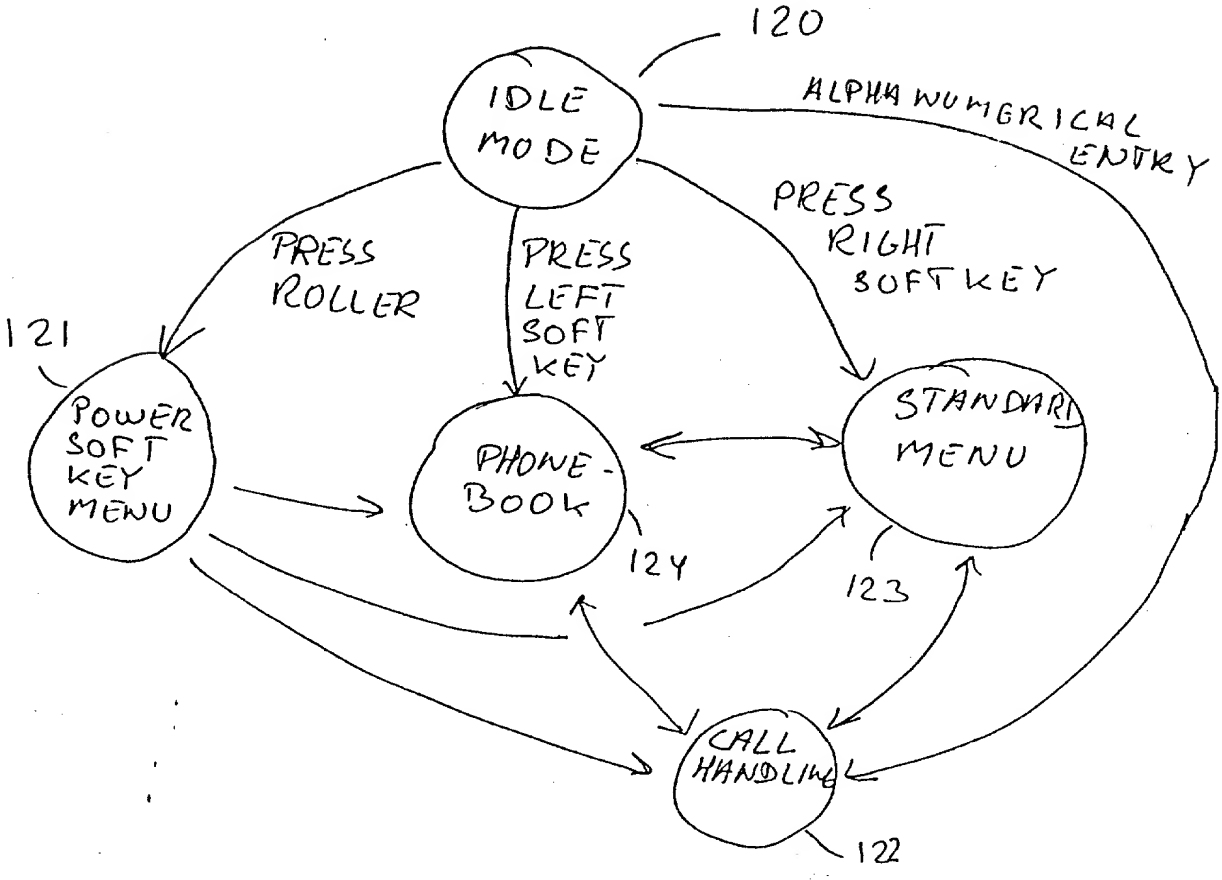
120
IDLE MODE
ALPHA NUMERICAL ENTRY
PRESS ROLLER
PRESS LEFT SOFT KEY
PRESS RIGHT SOFT KEY
121
POWER SOFT KEY MENU
PHONE-BOOK
STANDARD MENU
124
123
CALL HANDLING
122

Fig 11

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

COPY

This declaration is of the following type:

(check one applicable item below)

- [X] original.
- [ ] design.
- [ ] supplemental.

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

- [ ] national stage of PCT.

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

- [ ] divisional.
- [ ] continuation.
- [ ] continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor *(if only one name is listed below)* or an original, first and joint inventor *(if plural names are listed below)* of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

NAVIGATION KEY FOR A HANDSET

the specification of which:

(complete (a), (b) or (c))

(a) ☐ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☒ was filed on 09/04/97 as ☒ Serial No. 08 / 923,686
or ☐ ____________________
and was amended on ______________ *(if applicable).*

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and application number (consisting of the series code and the serial number; e.g., 08/123,456);

"(2) name of inventor(s), serial number and filing date;

"(3) name of inventor(s) and attorney docket number which was on the specification as filed;

"(4) name of inventor(s), title which was on the specification as filed and filing date;

"(5) name of inventor(s), title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(6) name of inventor(s), title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number; e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

Notice of July 13, 1995 (1177 O.G. 60).

(c) ☐ was described and claimed in PCT International Application No. ______________ filed on ______________ and as amended under PCT Article 19 on ______________ *(if any).*

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

☒ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and

☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119(a)–(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)–(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) ☒ no such applications have been filed.

(e) ☐ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐

CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER	FILING DATE
_____ /_____	_____
_____ /_____	_____
_____ /_____	_____

CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S) UNDER 35 U.S.C. 120

☐ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN PART (C-I-P) APPLICATION.

... AP ... CATION(S), IF ANY, FILED MORE ... HAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

NOTE: *If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.*

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Clarence A. Green (24,622)
Mark F. Harrington (31,686)
Harry F. Smith (32,493)

(check the following item, if applicable)

☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Clarence A. Green
Perman & Green, LLP
425 Post Road
Fairfield, CT 06430

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Clarence A. Green
(203) 259-1800

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

Full name of sole or first inventor

Frank		Nuovo
(GIVEN NAME)	(MIDDLE INITIAL OR NAME)	FAMILY (OR LAST NAME)

Inventor's signature ______

Date 11/24/97 Country of Citizenship U.S.A.

Residence 10950 Verano Road, Los Angeles, CA 90077

Post Office Address 10950 Verano Road, Los Angeles, CA 90077

Full name of second joint inventor, if any

Morten	Rolighed	Christenen
(GIVEN NAME)	(MIDDLE INITIAL OR NAME)	FAMILY (OR LAST NAME)

Inventor's signature ______

Date ______ Country of Citizenship Denmark

Residence Kulsviervej 116, DK 2800 Lyngby, Denmark

Post Office Address Kulsviervej 116, DK 2800 Lyngby, Denmark

Full name of third joint inventor, if any

Sten		Carlsen
(GIVEN NAME)	(MIDDLE INITIAL OR NAME)	FAMILY (OR LAST NAME)

Inventor's signature ______

Date ______ Country of Citizenship Denmark

Residence Leopardvej 6B, DK 2610 Rodovre, Denmark

Post Office Address Leopardvej 6B, DK 2610 Rodovre, Denmark

(Check proper box(es) for any of the following added page(s) that form a part of this declaration)

- [x] Signature for fourth and subsequent joint inventors. *Number of pages added* 1

• • •

- [ ] Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* ______

• • •

- [ ] Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* ______

• • •

- [ ] Added page for signature by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

• • •

- [ ] Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

  - [ ] Number of pages added ______

• • •

- [ ] Authorization of attorney(s) to accept and follow instructions from representative.

• • •

(If no further pages form a part of this Declaration, then end this Declaration with this page and check the following item)

- [ ] This declaration ends with this page.

Attorney's Docket No. 477-007455-US(PAR)

ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY FOURTH AND SUBSEQUENT INVENTORS

Full name of fourth joint inventor, if any

Christian		Kraft
GIVEN NAME	MIDDLE INITIAL OR NAME	FAMILY (OR LAST NAME)

Inventor's signature _____

Date _____ Country of Citizenship Denmark

Residence P.D. Lovs Alle 9, 3th, DK 2200 Kobenhavn N, Denmark

Post Office Address P.D. Lovs Alle 9, 3th, DK 2200 Kobenhavn N, Denmark

Full name of fifth joint inventor, if any

GIVEN NAME	MIDDLE INITIAL OR NAME	FAMILY (OR LAST NAME)

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____

Full name of sixth joint inventor, if any

GIVEN NAME	MIDDLE INITIAL OR NAME	FAMILY (OR LAST NAME)

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

- [X] original.
- [ ] design.
- [ ] supplemental.

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

- [ ] national stage of PCT.

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.

- [ ] divisional.
- [ ] continuation.
- [ ] continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor *(if only one name is listed below)* or an original, first and joint inventor *(if plural names are listed below)* of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

NAVIGATION KEY FOR A HANDSET

SPECIFICATION IDENTIFICATIO..

the specification of which:

(complete (a), (b) or (c))

(a) ☐ is attached hereto.

NOTE: *"The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:*

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☒ was filed on 09/04/97 as ☒ Serial No. 08 / 923,686
or ☐ ________________
and was amended on ________________ *(if applicable).*

NOTE: *Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.*

NOTE: *"The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:*

"(1) name of inventor(s), and application number (consisting of the series code and the serial number; e.g.,08/123,456);

"(2) name of inventor(s), serial number and filing date;

"(3) name of inventor(s) and attorney docket number which was on the specification as filed;

"(4) name of inventor(s), title which was on the specification as filed and filing date;

"(5) name of inventor(s), title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(6) name of inventor(s), title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number; e.g.,08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

Notice of July 13, 1995 (1177 O.G. 60).

(c) ☐ was described and claimed in PCT International Application No. ________________ filed on ________________ and as amended under PCT Article 19 on ________________ *(if any).*

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

☒ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and

☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119(a)–(d))

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)–(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) ☒ no such applications have been filed.

(e) ☐ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)–(d)

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐

CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER	FILING DATE
_____ /_____	_____
_____ /_____	_____
_____ /_____	_____

CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S) UNDER 35 U.S.C. 120

☐ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN PART (C-I-P) APPLICATION.

ALL FOREIGN APPLICATION(S), *IF ANY*, FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

NOTE: *If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.*

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

Clarence A. Green (24,622)
Mark F. Harrington (31,686)
Harry F. Smith (32,493)

(check the following item, if applicable)

☐ Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Clarence A. Green
Perman & Green, LLP
425 Post Road
Fairfield, CT 06430

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Clarence A. Green
(203) 259-1800

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

Full name of sole or first inventor

Frank		Nuovo
(GIVEN NAME)	*(MIDDLE INITIAL OR NAME)*	*FAMILY (OR LAST NAME)*

Inventor's signature ______

Date ______ **Country of Citizenship** U.S.A.

Residence 10950 Verano Road, Los Angeles, CA 90077

Post Office Address 10950 Verano Road, Los Angeles, CA 90077

Full name of second joint inventor, if any

Morten	Rolighed	Christenen
(GIVEN NAME)	*(MIDDLE INITIAL OR NAME)*	*FAMILY (OR LAST NAME)*

Inventor's signature ______

Date 24/11/97 **Country of Citizenship** Denmark

Residence Kulsviervej 116, DK 2800 Lyngby, Denmark

Post Office Address Kulsviervej 116, DK 2800 Lyngby, Denmark

Full name of third joint inventor, if any

Sten		Carlsen
(GIVEN NAME)	*(MIDDLE INITIAL OR NAME)*	*FAMILY (OR LAST NAME)*

Inventor's signature ______

Date 24-11-97 **Country of Citizenship** Denmark

Residence Leopardvej 6B, DK 2610 Rodovre, Denmark

Post Office Address Leopardvej 6B, DK 2610 Rodovre, Denmark

(check proper box(es) for any of the following added page(s) that form a part of this declaration)

☒ Signature for fourth and subsequent joint inventors. *Number of pages added* 1

• • •

☐ Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* ______

• • •

☐ Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* ______

• • •

☐ Added page for signature by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

• • •

☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☐ Number of pages added ______

• • •

☐ Authorization of attorney(s) to accept and follow instructions from representative.

• • •

(if no further pages form a part of this Declaration, then end this Declaration with this page and check the following item)

☐ This declaration ends with this page.

Attorney's Docket No. 477-007455-US(PAR)

ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY FOURTH AND SUBSEQUENT INVENTORS

Full name of fourth joint inventor, if any

Christian (GIVEN NAME) | (MIDDLE INITIAL OR NAME) | Kraft (FAMILY (OR LAST NAME))

Inventor's signature Christian Kraft

Date 24.11.97 Country of Citizenship Denmark

Residence P.D. Lovs Alle 9, 3th, DK 2200 Kobenhavn N, Denmark

Post Office Address P.D. Lovs Alle 9, 3th, DK 2200 Kobenhavn N, Denmark

Full name of fifth joint inventor, if any

(GIVEN NAME) | (MIDDLE INITIAL OR NAME) | (FAMILY (OR LAST NAME))

Inventor's signature

Date Country of Citizenship

Residence

Post Office Address

Full name of sixth joint inventor, if any

(GIVEN NAME) | (MIDDLE INITIAL OR NAME) | (FAMILY (OR LAST NAME))

Inventor's signature

Date Country of Citizenship

Residence

Post Office Address